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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,891	09/15/2003	Brent Everett Little	Lo-31	8528
7590 03/29/2005				
HungChang LIN		EXAMINER		
8 Schndler Ct.		KIANNI, KAVEH C		
Silver Spring, MD 20903				
		ART UNIT	PAPER NUMBER	
		2883		

DATE MAILED: 03/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/661,891

Applicant(s)

LITTLE, BRENT EVERETT

Examiner

Kianni C. Kaveh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 13-15 is/are rejected.
- 7) ☐ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings 11-13 are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: All elements of Figures 11-13 are not discussed or mentioned in the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Allowable Subject Matter

Claim 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Claim 11 is allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious said core is of core material selected from the group consisting of silicon oxynitride (SiON), silicon nitride, silicon (Si), and tantalum oxide-silica ($\text{Ta}_{2.0}\text{O}_{5.5}\text{SiO}_{2.2}$); the lower cladding is of silica (SiO_2); and said upper cladding is of thermal oxide in combination with the rest of the limitations of the base claim.

Claims 12 is allowable because the prior art of record, taken alone or in combination, fails to disclose or render obvious wherein said core material is deposited by a process selected from the group consisting of flame hydrolysis and sputtering; and SiON and said SiO_2 are deposited by chemical vapor deposition (CVD) in combination with the rest of the limitations of the base claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-10 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takabayashi et al. (US 2004/0101227).

Regarding claims 1 and 9, Takabayashi teaches an optics polarization beam splitter for separating perpendicular components of an incident optical signal using an asymmetric Mach-Zehnder interferometer (shown in at least fig. 1-3; also see abstract), comprising: an input optical coupler DC1 to split an incident optical signal, which has two perpendicular polarization states TE, TM, into a first waveguide branch 22 and a second waveguide branch 21 wherein said first waveguide branch has a birefringent section that exhibits form-birefringence to segregate said two perpendicular polarization states (see parag. 0093); and an output optical coupler DC2 to combine the optical signals outputted from said first waveguide branch 22 and said second waveguide branch 21 and to output two perpendicular output optical signals (see fig. 3, item TE, TM and see parag. 0023; also see fig. 28, item TE and TM combining).

However, Takabayashi does not specifically/explicitly teach wherein the above polarization states are orthogonal and that wherein said input 3-dB optical coupler and said output 3-dB optical coupler are Mach-Zehnder balanced couplers (see also 0122 and 0140). Nevertheless, Takabayashi states that these states are perpendicular polarization states and that wherein the input optical coupler and said output optical coupler are 3-dB Mach-Zehnder couplers (see at least fig. 2-3, 3-db MZI couplers DC1 and DC2 with output signals shown in fig. 3). Thus, it would have been obvious/well-known to those of ordinary skill in the art when the invention was made that perpendicularly polarization states are/known perpendicular polarization states TE, TM and that the 3-dB MZI couplers of Takabayashi can be replaced with that of 3-dB MZI balanced coupler, since such configuration is conventional and with such the

orthogonally states in an output coupling would provide superfast optical communication with no loss (see parag. 0001).

Regarding claims 2-4, 6-8,10 and 13-15, Takabayashi further teaches wherein said optical input couplers and said optical output coupler are 3-dB couplers (see parag. 0090); wherein said two perpendicular polarization states are transverse electric (TE) mode and transverse magnetic (TM) mode (see at least parag. 0002); wherein said birefringent comprises successive layers of a lower cladding, a core, a birefringent layer, and an upper cladding (see at least fig. 1, items successive layers of a lower cladding, a core/waveguide, a birefringent layer BF1/BF2, and an upper cladding on a substrate; see also at least parag. 0090); further comprising a heater wrapped around said second waveguide branch below said birefringent section (see at least figure 1 and item heater wrapped around waveguide branch below birefringent section BF, also parag. 0092); a heater wrapped around said birefringent section of said first waveguide (see at least fig. 13, item a heater wrapped around said birefringent section of said first waveguide); wherein said input 3-dB optical coupler and said output 3-dB optical coupler are Mach-Zehnder balanced couplers (see at least fig. 2-3, wherein 3-db couplers DC1 and DC2 balance/couple portions of input signals as shown in fig. 3); wherein said birefringent section is coated with a high index of refraction layer (see at least parag. 0140 and 0165-0166); further comprising a cascade of said beam splitter connected between said input optical coupler and said output optical coupler (shown at least in fig. 1, items DC1-4); wherein the heater is used to toggle the states of polarization at the output of

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said output optical coupler (shown at least in fig. 3 and , items toggled TE and TM states of output polarization); wherein the first stage of said cascade is operated in one polarization state, and the second stage of said cascade is operated in a second polarization state (shown in at least fig. 1, item polarization states changed through cascade stages; see also BF1 and BF2 which also change polarization TE and TM states).

Claims 1-10 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pezeshki et al. (US 2003/0026518).

Regarding claim 1-3, Pezeshki teaches an optics polarization beam splitter for separating orthogonal components of an incident optical signal using an asymmetric Mach-Zehnder interferometer (shown in at least fig. 1 and/or 2); comprising: an input optical 3-dB coupler to split an incident optical signal (see at least fig. 1, item coupler 13), which has two orthogonal polarization states, TE and TM modes (shown in fig. 2, items TE and TM), into a first waveguide branch and a second waveguide branch wherein said first waveguide branch has a birefringent section that exhibits form-birefringence to segregate said two orthogonal polarization states (see at least fig. 1-2, items 14 and 15, and parag. 0026-0027); and an output optical 3-dB coupler to combine the optical signals outputted from said first waveguide branch and said second waveguide branch and to output two output optical signals (see fig. 1, 2, 4, 5, TE and TM orthogonal outputs; see parag. 009-0010 and 0045-0046).

However, Pezeshki does not specifically teach wherein the above output optical signals are orthogonal. Nevertheless, Pezeshki states that the output components are comprised with TE and TM signals shown in at least figures 4 and 5. Thus, it is obvious/well-known to those of ordinary skill in the art when the invention was made that these TE,TM optical components are orthogonal since such configuration is conventional and with such the orthogonally states in an output coupling would provide gain equalization in a superfast optical communication with no loss.

Regarding claim 4-10 and 13-15, wherein said birefringent comprises successive layers of a lower cladding, a core, a birefringent layer, and an upper cladding (see parag. 0025 and 0033); wherein said birefringent section of said first waveguide branch has a width narrower than a normal width of said second waveguide branch (see parag. 0033 and 0039); a heater 16 wrapped around said second waveguide branch below said birefringent section; a heater wrapped around said birefringent section of said first waveguide (see fig. 8, item 16/81); teaches balancing 3-dB MZI coupler (see 0043 and 0029, wherein gain equalizing by 3dB couplers is balancing of TE and TM mode); wherein said birefringent section is coated with a high index of refraction layer (see parag. 009 and 0014); wherein said birefringent section is coated with a birefringent layer (see parag. 009 and 0014-0015) ; further comprising a cascade of said beam splitter connected between said input optical coupler and said output optical coupler wherein the heater is used to toggle the states of polarization at the output of said output optical coupler wherein the first stage of said cascade is operated in one polarization state,

and the second stage of said cascade is operated in a second polarization state (see figures 7 and 2-5; items toggled TE,TM in cascaded stages).

Citation of Relevant Prior Art

Prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In accordance with MPEP 707.05 the following references are pertinent in rejection of this application since they provide substantially the same information disclosure as this patent does. These references are:

Carberry et al. 6278821 teaches balancing 3-dB MZI coupler

Magne et al. 6639681 teaches balancing 3-dB MZI coupler

Henry et al. 5889890 teaches balancing 3-dB MZI coupler

Bandyopadyopadyay 20040013357

Inoue et al. 5546483

Henry et al. 5341444

Pezeshki et al. 6760499

Liu 20020159702

These references are cited herein to show the relevance of the apparatus/methods taught within these references as prior art.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Cyrus Kianni whose telephone number is (571) 272-2417.

The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (571) 272-2415.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9306 (for formal communications intended for entry)

or:

Hand delivered responses should be brought to Crystal Plaza 4, 2021 South Clark Place, Arlington, VA., Fourth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956.



K. Cyrus Kianni
Patent Examiner
Group Art Unit 2883

March 22, 2005